

REMARKS

This application has been amended so as to place it in condition for allowance at the time of the next Official Action.

The Official Action objects to a number of claims based on improper dependency. Please note that applicant has amended the claims as necessary in order to correct the dependency, and reconsideration and withdrawal of this objection are therefore respectfully requested.

The Official Action rejects claims 7-9 under 35 USC §102(b) as being anticipated by BOHNING 4,855,910. Reconsideration and withdrawal of this rejection are respectfully requested for the following reasons:

The device of the present invention is designed to use as input a set of finished images of the moving part taken at various points in time. Such images may have been taken over the course of several periods of motion, without any correspondence between the times that the images were captured and the period of motion of the moving part. As a result, there is no simple way to determine at what point in a single exemplary cycle each image was taken. But this is necessary in order to arrange them in order so as to present a chronological sequence within a single period. Once arranged into the proper order within a single period or cycle, the individual still images can be converted into a motion picture of the moving part, for example, a beating

heart. This procedure can be applied not only to a heart but also lungs undergoing respiration or any other moving body part.

At the outset, this applicability of the present inventive device to any periodically moving part initially distinguishes it from the device of BOHNING, which relates exclusively to images of the heart. Moreover, this highlights a fundamental distinction between the manner of operation of the present device and that of the BOHNING patent. Specifically, the present invention performs the ordering process using only information contained in the pictures themselves. The device identifies a feature that is displaced between different images represented by the data records and sorts the data records based on a cyclic sequence based on changes in distance or phase shifts of the identified feature.

In stark contrast, the device of BOHNING works in an entirely different fashion. In order to arrange the pictures in order, the BOHNING device cannot rely simply on identified points on the pictures being examined and evaluated, but requires additionally an EKG and respiration cycle, which must be specifically recorded and stored with the pictures. The BOHNING device then uses the electrocardiograms or the respiration recording curves to perform the step of arranging the pictures in sequence.

These additional measurements and recordings are not required by the device of the current invention. Instead, the

current device bases the ordering only on the data within the images themselves.

Moreover, in the BOHNING device it is not the actual finished pictures which are sorted. It is in such pictures that the indicated separate points and their location and phase shifts can be examined, on the basis of which the sequential arrangement takes place. Instead, in the BOHNING device the k-space data are recorded with the data of the EKG devices and the data of the respiration measuring device, and the k-space data are arranged in order. Here the k-space data are those data which are obtained in an NMR measurement, rather than the actual pictures being prepared by using Fourier transforms.

The k-space data could not be arranged at all with the device as claimed, since certain fixed points of the moving organ are not localized at all on these k-space data, and thus their displacements could not be evaluated.

Regardless of whether the BOHNING device were incapable of producing a cyclic arrangement of images, the point remains that it is only the k-space data that are arranged, not the finished pictures. To arrange the pictures in order, it would be necessary to record with the pictures the EKG and respiration frequency curves at the same time as image capture. This would be required in order to enable the determination of the instant of the NMR image capture using the naturally measurable phase of

a certain recording point in the EKG or in the respiration frequency curve.

In order to sharpen the distinction between the present invention and the BOHNING device, please note that applicant has amended independent claim 7 to more clearly define features of the present device absent from the BOHNING device.

The Official Action rejects claim 10 under 35 USC §103(a) as being unpatentable over BOHNING in view of GAARDER 3,575,162. The Official Action relies on the secondary GAARDER reference only for its asserted teaching or suggestion that a heart pulse can be read in as a sinusoidal waveform. However, irrespective of the ability of the secondary reference to teach or suggest that for which it is offered, it nevertheless fails to overcome the shortcomings of the primary BOHNING reference in light of the analysis presented above in connection with anticipation rejection as well as the amendment of independent claim 7. Accordingly, the combination necessary fails to render obvious the full set of features implicitly recited by claim 10 by virtue of its dependence, and reconsideration and withdrawal of this rejection are therefore respectfully requested.

In addition to the amendments described above, applicant has added new claims 13-16, each of which ultimately depends from amended independent claim 7.

Applicant has also amended original claim 11, which depends directly from amended claim 7 and further recites that

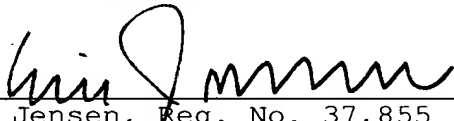
the data records represent images recorded stroboscopically without defined frequency and phase relationships with the motion of the moving part. In addition to the features of independent claim 7, amended claim 11 and new claim 14 recite this feature, which is clearly undisclosed by any of the known prior art, which requires the capture of some additional information beyond the images of the moving part themselves.

In light of the amendments provided above and the arguments offered in support thereof, applicant believes that the present application is in condition for allowance and an early indication of the same is respectfully requested.

If the Examiner has any questions, or requires further clarification of any of the above points, the Examiner may contact the undersigned attorney so that this application may continue to be expeditiously advanced.

Respectfully submitted,

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